

Armed Forces Epidemiological Board

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EARLY WARNING RADAR Radio Frequency Energy (RFE) Operational Considerations

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PURPOSE

To provide background on the Air Force's Early Warning Radar System and discuss the radar's radio frequency energy (RFE) characteristics

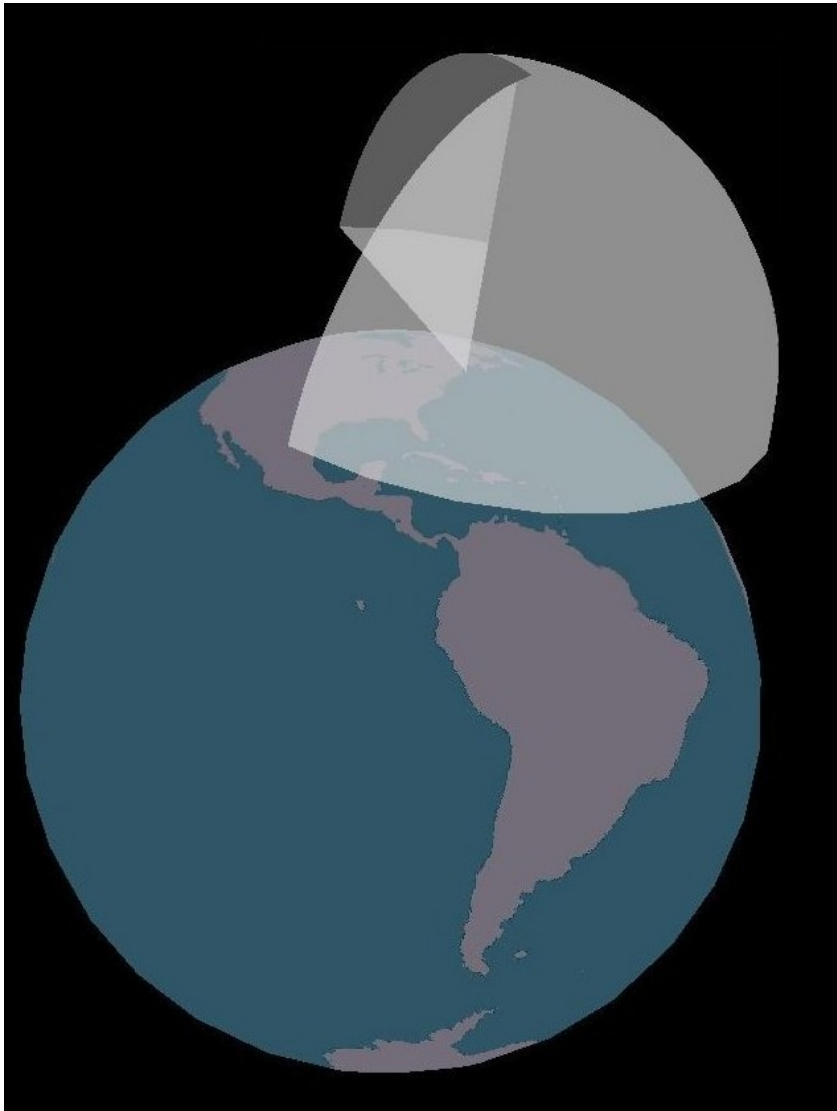
OVERVIEW

- **Mission**
- **Characteristics**
- **Health and Safety**
- **RFE Survey
Results**
- **Summary**

GROUND-BASED RADAR SYSTEMS

- **Mission:**
 - **Missile Warning (Integrated Tactical Warning and Attack Assessment)**
 - **Space Surveillance**
- **Assets:**
 - **PAVE Phased-Array Warning System (PAWS)**
 - **Beale and Cape Cod**
 - **Ballistic Missile Early Warning System (BMEWS)**
 - **Clear, Thule and Fylingdales**
- **System:**
 - **Solid-State Phased-Array Radar System at all sites**

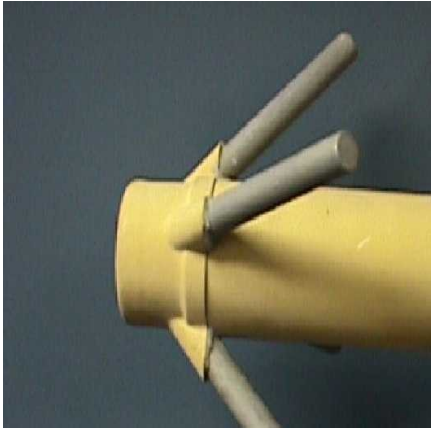
CAPE COD PAVE PAWS COVERAGE



- 240 Degree in azimuth
- 3 - 85 Degrees Elevation
- 3,000 mile Range
- T
s



PAVE PAWS CHARACTERISTICS



- **Built in 1978, 10 stories tall**
- **Two array faces with 5376 antenna elements**
 - **Only 1792 active on each face**
- **Operates between 420 and 450 MHz**
- **Peak Power 543 Kw**
- **Pulse width from .3 to 16 ms**
- **“Listens” 75 percent of time**

OPERATIONAL HEALTH AND SAFETY

- **Comply with Exposure Standards Developed by the Institute of Electrical and Electronics Engineers (IEEE) and Adopted by the American National Standards Institute (ANSI) and Air Force**
 - **Occupational Limit: 1.4 mW/cm^2**
 - **General Population: 0.28 mW/cm^2**

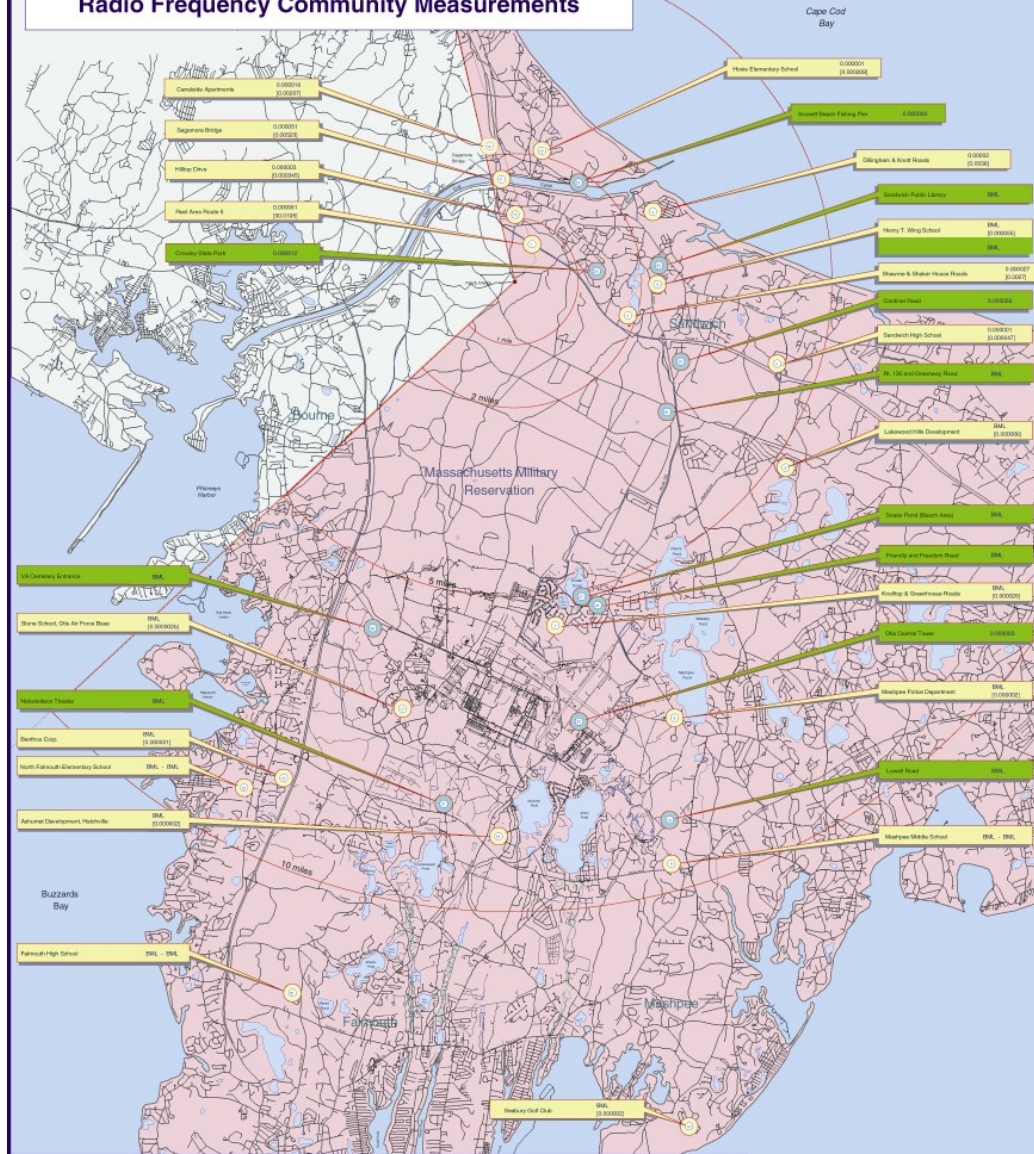
**Based on average power
density**

RFE ASSESSMENTS

(see handouts for details)

Year	Description	Results (max)
1978	Measurements performed at 21 locations in the community	Peak power (19.6 $\mu\text{W}/\text{cm}^2$) Avg power (.06 $\mu\text{W}/\text{cm}^2$)
1986	Measurements performed at 15 locations in the community	Avg power (0.028 $\mu\text{W}/\text{cm}^2$)
1992	Measurements taken in compound for occupational exposures	Avg power (0.39 mW/cm^2)
1995	Assessment of impact from lower national standards	No impact
1996	Spot check following system software modification	No change in operational environment

PAVE PAWS Radio Frequency Community Measurements



ANSI / IEEE Standards
Radio Frequency Emissions

Occupational
General Population

1.4 mW/cm²
0.28 mW/cm²

Radio Frequency Measurements of PAVE PAWS Radar,
1978 / 1986



Measured PAVE PAWS Radio Frequency

Location of Measurement	Measured Average	Measured Peak
N. Falmouth Elementary School	0.000001	0.000001
Falmouth High School	0.000001	0.000001
Stone School	0.000001	0.000001
Hosie Elementary School	0.000001	0.000001
Henry T. Wing School	0.000001	0.000001
Sandwich High School	0.000001	0.000001
Mashpee Police Dept.	0.000001	0.000001
Mashpee Middle School	0.000001	0.000001
Seabury Golf Club	0.000001	0.000001

SUMMARY

- **System crucial to National Defense**
 - **Cape Cod site only system on eastern seaboard**
- **Meets all current health and safety standards**
- **Air Force committed to addressing public concerns**